



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,698	10/05/2006	Hiroyuki Kikuchi	P30902	2938
7055	7590	06/05/2008	EXAMINER	
GREENBLUM & BERNSTEIN, P.L.C. 1950 ROLAND CLARKE PLACE RESTON, VA 20191				ISLA RODAS, RICHARD
ART UNIT		PAPER NUMBER		
2829				
			NOTIFICATION DATE	
			DELIVERY MODE	
			06/05/2008	
			ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com
pto@gbpatent.com

Office Action Summary	Application No.	Applicant(s)	
	10/599,698	KIKUCHI ET AL.	
	Examiner	Art Unit	
	RICHARD ISLA RODAS	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 19 February 2008.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-16 and 18 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 6 is/are allowed.
- 6) Claim(s) 1-5,7-9,11-14,16 and 18 is/are rejected.
- 7) Claim(s) 10 and 15 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 05 October 2006 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____ .	6) <input type="checkbox"/> Other: _____ .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the US Patent to Akram et al. #7,148,715 in view of the US Patent to Smith #5,690,467.

In terms of claim 12, Akram teaches in Figure 2, a method comprising bringing an inverted image sensor (240) into electrical contact with a contact (292) of a test head (290) and emitting light (282) on a light receiving surface of the inverted image sensor to test the optical properties of the inverted image sensor (as explained in lines 37 and 38, col. 13).

Akram teaches all of the method steps as explained above, except for the steps for performing the inversion of the image sensors before and after testing. That is, although Akram teaches the testing is done on an inverted image sensor, Akram is silent

as to the steps for inverting a device before and after testing. However, mechanisms for inverting a device prior to and after testing are well known in the art. For example, Smith shows in Figure 1, a testing system including a (tester 11) which is provided with inverted devices (devices under test 13) inverted by a first inverting mechanism (24). After testing is completed, the inverted devices are inverted once again by second inverting mechanism (41).

It would have been obvious to one of the ordinary skill in the art, at the time of the invention, to use the teachings of inverting mechanisms as disclosed by Smith to provide inverting means in the device disclosed by Akram in order to minimize potential debris likely to accumulate on the side of the image sensors (240) as testing is performed, as suggested by Akram in lines 58-62, col. 5.

As to claim 13, Akram in view of Smith discloses the claimed method except for the first and second inverter performing the step of inverting at least two image sensors before and after testing. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to duplicate the number of suction cups (33 and 44) in the first and second inverters (24 and 41), so a plurality of devices under test is inverted at the same time (thus reducing handling time and thus operating costs), since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

4. Claim 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Smith and further in view of the US Patent to Litt et al. #5,091,963.

As to claims 14 and 16, Akram in view of Smith substantially teaches all of the claimed method steps, except for obtaining an image of an image sensor to obtain device type information before testing the inverted image sensor and further sorting the tested sensor based on said type information. The use of imaging devices for the detection of irregularities in devices is however, well known in the art. For example, Litt teaches in Figure 1, the use of an imaging system (7) connected to a computer (11+13) which is further connected to an electromechanical apparatus (see lines 15-16, col. 5). The imaging system inspects the devices under test, and (using the electromechanical apparatus and the computer) sorts the device out in accordance with whether the device is defective or not (see line 18, col. 5). It would have been obvious to one of the ordinary skill in the art, at the time of the invention, to use the teachings of sorting of devices using information provided by imaging systems as disclosed by Litt, to inspect the devices before they are supplied to the test head (11) in Smith's device, in order to inspect the devices both electrically and visually, which provides a more accurate portrait of the state of the devices under test.

5. Claims 1-4 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Smith and further in view of the US Patent to Hiruta #5,952,841.

In terms of claims 1 and 18, Akram shows in Figure 2, an image sensor test system comprising a light source (280) which is positioned within a the test system

(120) so as to place the light source beneath the image sensor (240). It should be noted that the group of light sources (280) is an integral part of the system shown in Figure 2, and thus, is inherently attached to the system.

Akram substantially teaches the claimed elements as discussed above, except that Akram is silent with respect to the mechanism used for inverting the image sensors prior to and after testing. However, such inverting mechanisms are well known in the art. For example, Smith shows in Figure 1, a testing handling system comprising a pre-test sensor stacker (79) storing devices under test 13 (DUT hereinafter) before testing, a first inverter (24) configured to invert the DUTs from the pre-test sensor stacker (19), a second inverter (41) configured to invert a device (17) after testing and a plurality of post-sensor stackers (20 and 21) configured to store the DUTs inverted by the second inverter. It would have been obvious to one of ordinary skill in the art at the time the invention was made, to use the handling mechanism, including inverting means taught by Smith, to provide the inverted image sensors in the device of Akram, in order to provide for an efficient handling of the image sensors which reduces strains and stresses on the personnel who would otherwise have to handle the image sensors manually, as suggested by Smith in lines 46-48, col. 1.

Finally, Smith doesn't teach the use of a contact arm configured to pick up and move the inverted DUT and also configured to bring input/output terminals of the DUT into electrical contact with a contact of the test head. Instead, Smith uses a conveyor belt (12) to move the devices towards the test head (11). However, the use of contact arms configured to bring DUTs into contact with a test head are well known in the art.

For example, Hiruta shows in Figure 1, a chip tester comprising an inverting mechanism (3b) which inverts devices under test so that a contact arm (4) may pick them up and bring them into contact with a testing board (5). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the teachings of contact arms, as taught by Hiruta, to include a contact arm in the device by Smith in order to pick the DUTs from the conveyor belt and place them on the testing mechanism inside the test head 11, since using a contact arm that moves horizontally ensures that the inverted orientation of the inverted devices is maintained as they are placed on the test head.

As to claim 2, Akram in view of Smith discloses the claimed invention except for the first and second inverter being configured to simultaneously invert at least two image sensors. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to duplicate the number of suction cups (33 and 44) in the first and second inverters (24 and 41), so that a plurality of DUTs is inverted at the same time (thus reducing handling time and thus operating costs), since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

As to claims 3 and 4, Akram shows in Figure 3, the first and second inverters (24 and 41) comprise a first holder (28 and 49 respectively) which comprise suction

nozzles (see line 22, col. 4 and line 55, col. 4) and a rotation mechanism (29 and 53 respectively) configured to rotate the first holders.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Smith in view of Hiruta and further in view of the US Patent to Zaiser #6,624,646.

As to claims 5, Akram in view of Smith substantially teaches all of the claims as discussed above. However, Smith doesn't explicitly state that the holder can be exchanged. However, exchanging parts within a system in order to accommodate a plurality of differently sized devices or simply to replace parts of the system that have malfunctioned during normal use is well known in the art. For example, Zaiser teaches a testing apparatus including parts that can be easily exchanged without requiring replacing the entire system (see lines 14-16 column 3). Given the teachings of Zaiser, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Smith's device by employing the well known or conventional features of exchangeable parts, such as disclosed by Zaiser, in order to easily replace a defective part of the system without requiring to exchange the entire system.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Smith in view of Hiruta and further in view of the US Patent to Kiyokawa et al. #6,019,564 (Kiyokawa hereinafter).

In terms of claim 7, Akram in view of Smith and Hiruta substantially teach all claimed features as explained above (please refer to the rejection of claim 1). Furthermore, Smith teaches the first and second inverters (24 and 41) each comprise a first holder (28 and 49 respectively) and a rotation mechanism (29 and 53 respectively), wherein the first holders are configured to hold the DUTs after inversion (for example, as shown in Figures 2 and 3, the holders 28 and 49 hold the DUT in place before placing them on their respective destinations).

However, Smith's handling system uses one holder in each inverter and not two holders as claimed. Nevertheless, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to include a second holder in each of the first and second inverters in order to move/handle twice as many DUTS at the same time, thus reducing production and testing costs, since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

Finally, Smith doesn't explicitly teach the holders are all provided with a recess configured to hold the image sensor. However, the use of a recess in vacuum holders is well known in the art. For example, Kiyokawa shows in Figure 2, a vacuum pick up head (3R) which comprises a recess (the recessed aperture at the bottom of the head) which is used to pick and drop (and hence hold) ICs, as explained in for example, lines 12-16, col. 7. The recess in Kiyokawa's vacuum head 3R has a conical shape (as opposed to a squared shape) which maximizes the area of contact (bottom of the conical recess) while minimizing the areas where air pressure isn't needed (top of the

conical recess). Shaping the vacuum head with a conical recess ensures that pressure is only used where needed, which in turn maximizes air pressure provided by the suction head. It would have been obvious to one of the ordinary skill in the art, at the time of the invention, to use the teachings of recessed surfaces as disclosed by Kiyokawa to shape the bottom of the holders (28 and 49) in a recessed shape in the in order to maximize suction of the vacuum pick-up head.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Smith further in view of Kiyokawa and further in view Zaiser.

In terms of claim 8, Akram in view of Smith and further in view of Kiyokawa, substantially teaches all of the claims as discussed above. However, Smith doesn't explicitly state that the holder can be exchanged. However, exchanging parts within a system in order to accommodate a plurality of differently sized devices or simply to replace parts of the system that have malfunctioned during normal use is well known in the art. For example, Zaiser teaches a testing apparatus including parts that can be easily exchanged without requiring exchange the entire system (see lines 14-16 column 3). Given the teachings of Zaiser, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Smith's device by employing the well known or conventional features of exchangeable parts, such as disclosed by Zaiser, in order to easily replace a defective part of the system without requiring to exchange the entire system.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Smith and further in view of the US Patent to Tran et al. #6,944,324 (Tran hereinafter).

In terms of claim 9, Akram in view of Smith substantially teach all claimed features as mentioned above (please refer to the rejection of claim 1). However, Smith fails to teach an imaging device configured to obtain an image of a back surface of the image sensor after being inverted by the first inverter and before being supplied to the test head. That is, Smith's system doesn't include an imaging system placed above the conveyor belt (12) that images the back side (of the inverted DUTs) while traveling in the conveyor belt before entering the testing head (11).

However, the use of imaging devices configured to obtain images of DUT's while traveling on conveyor belts is well known in the art. For example, Tran teaches in Figure 1, an imaging device (20), configured to obtain images of devices (12) as they travel on a conveyor belt (14), in order to detect the presence of overlapping objects. It would have been obvious to one of the ordinary skill in the art, at the time of the invention, to use the teachings of imaging devices disclosed by Tran to include an imaging system above the conveyor belt (12) in the device disclosed by Smith, in order to detect whether DUTs have been placed in positions that overlap each other (which may evidence a malfunction of the first inverting means (32) or the contact arm (27)).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram in view of Smith and further in view of Tran and further in view of Litt.

As to claim 11, Akram in view of Smith and Tran substantially teach all of the claimed elements as discussed above. Furthermore, Smith teaches a selector (58) which selects a tested sensor stacker (the tested device is either unloaded in stacker 20 or 21) to unload the image sensor (using arm 48 in the second inverter 41) from among the plurality of sensor stackers (20 or 21). In addition, Tran shows an imaging device (20) that collects images of the devices under test. However, Tran doesn't teach using the camera to provide information to the selector so that it can unload the tested devices based on said information.

However, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. "Apparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). See MPEP § 2114. That is, because the prior art in combination anticipates all of the structural characteristics in the claimed device, it anticipates the claim regardless of the function said structure is intended to perform.

Nevertheless, Litt teaches in Figure 1, the use of an imaging system (7) connected to a computer (11+13) which is further connected to an electromechanical apparatus (see lines 15-16, col. 5). The imaging system inspects the devices under test, and (using the electromechanical apparatus and the computer) sorts the device out

in accordance with whether the device is defective or not (see line 18, col. 5). It would have been obvious to one of the ordinary skill in the art, at the time of the invention, to use the teachings of sorting of devices using information provided by imaging systems as disclosed by Litt, to use the camera disclosed by Tran in order to supply sorting information to the selector (58) in Smith's device, in order to inspect the devices both electrically and visually, which provides a more accurate portrait of the state of the devices under test.

Allowable Subject Matter

11. Claim 6 is allowed. The following is an examiner's statement of reasons for allowance:

In terms of claim 6, the prior art of record does not teach alone or in combination a image sensor test system wherein each of the first and second inverters comprises a rotation mechanism, wherein the rotation mechanism comprises a pinion gear which supports the first holder and a rack which intermeshes with the pinion gear and converts linear force supplied to the rack gear to rotational force so as to rotate the first holder, in combination with all other elements in claim 6.

12. Claims 10 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In terms of claim 10, the prior art of record does not teach alone or in combination an image sensor test system comprising a judging means device configured to judge an emission pattern of light emitted from the light source and an input pattern of electrical signals input from a contact of the test head based on image information obtained by the imaging device, in combination with all other elements in claim 10.

In terms of claim 15, the prior art of record does not teach alone or in combination a method for an image sensor comprising a judgment step of judging an emission pattern of light emitted from the light source and an input pattern of electrical signals input from a contact of the test head based on the device type information obtained in obtaining the image of the image sensor, in testing the inverted image sensor, emitting light to the light receiving surface of the image sensor in accordance with the emission pattern and inputting and outputting electrical signals between the contact of the test head and the image sensor in accordance with the input pattern, in combination with all other elements in claim 15.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Document Number Number-Kind Code e.g. 0500004.41	Date MM-YYYY	Name	Classification
5,631,573	05-1997	Ohno, Toshi	324/754
5,374,888	12-1994	Karasawa, Wataru	324/765
6,788,091	09-2004	Weber, David M.	324/765

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Isla-Rodas whose telephone number is (571) 272-5056. The examiner can normally be reached on Monday through Friday 8 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ha Nguyen can be reached on (571) 272-1678. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

Application/Control Number: 10/599,698
Art Unit: 2829

Page 15

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Richard Isla-Rodas
May 28, 2008

/VINH P NGUYEN/
Primary Examiner, Art Unit 2829